Welcome to The Department of Geosciences
Geosciences

Academic Year: 2017-18
Address: Guyot Hall
Phone: 609-258-6144
Website: [Department of Geosciences](http://www.princeton.edu/geosciences/)
Program offerings: Ph.D.

**Overview**  **Applying**  **Ph.D.**  **Faculty**  **Courses**

**Chair**
Bess B. Ward

**Associate Chair**
Thomas S. Duffy

**Director of Graduate Studies**
Jeroen Tromp

**Professor**
Thomas S. Duffy
Gerta Keller
François Morel, also Princeton Environmental Institute
Satish C. B. Myneni
Tullis C. Onstott
Michael Oppenheimer, also Woodrow Wilson School, Princeton Environmental Institute
Allan M. Rubin
Jorge L. Sarmiento
Daniel M. Sigman
Frederik J. Simons
Jeroen Tromp, also Applied and Computational Mathematics
Gabriel A. Vecchi, also Princeton Environmental Institute
Bess B. Ward, also Princeton Environmental Institute

Associate Professor
Stephan A. Fueglistaler
Adam C. Maloof
Blair Schoene

Assistant Professor
John A. Higgins
Jessica C. E. Irving
Laure Resplandy, also Princeton Environmental Institute
Xinning Zhang, also Princeton Environmental Institute

Associated Faculty
Michael A. Celia, Civil and Environmental Engineering
Peter R. Jaffé, Civil and Environmental Engineering
Denise L. Mauzerall, Woodrow Wilson School, Civil and Environmental Engineering
Catherine A. Peters, Civil and Environmental Engineering
James A. Smith, Civil and Environmental Engineering
Eric F. Wood, Civil and Environmental Engineering
The Department of Geosciences, together with its affiliated interdepartmental programs and institutes, serves as Princeton's central focus for the earth, atmospheric, oceanographic and environmental sciences. As such, the department encompasses a rich diversity of scientific expertise and initiatives, ranging from the measurement and modeling of global climatic change to high-pressure mineral physics, and from seismic tomographic imaging of the mantle to biogeochemistry and isotope geochemistry of the Earth and oceans.

Atmospheric and ocean sciences are an integral part of the department, with some of the research taking place in the Geophysical Fluid Dynamics Laboratory (GFDL). In addition, there are close ties with the programs in water resources in the Department of Civil and Environmental Engineering, as well as with the Princeton Environmental Institute (PEI) and the Princeton Institute for the Science and Technology of Materials (PRISM). We also provide computational geosciences as an interdisciplinary graduate training program.

Graduate education within the department, in general, is strongly focused on research, as well as on developing a keen sense for the interdisciplinary nature of the geosciences. As a consequence, Princeton has been extraordinarily successful in mentoring students to move on to tenure-track positions in academia as well as leading research positions in industry or government laboratories. The department offers only a Doctor of Philosophy (Ph.D.) program, for which both beginning and advanced students may apply. The average time to graduation is five years.

**Academics and Research**

The Department of Geosciences covers a wide range of fields, and actively promotes interdisciplinary study and research. Students with interest in tectonics and geophysics,
seismology, Earth history, geochemistry, geochronology, petrology, mineral physics, biological
oceanography, biogeochemistry, paleontology, paleoceanography and paleoclimate and
environmental geology will find most of their research and educational needs accommodated
within the laboratories of Guyot Hall.

In addition, the department has associated programs in water resources (shared with Civil
Engineering), materials science (in collaboration with the Princeton Materials Institute) and
environmental science (in collaboration with Princeton Environmental Institute, or PEI).

Equipment and Facilities

Modern earth science has a continuum of approaches, ranging from field studies to laboratory
and theoretical work using sophisticated instrumentation and large computers. In addition to
petrographic, mineralogic, sedimentologic, and paleontologic facilities for routine geoscientific
inquiry, the department has specialized equipment for laboratory and field studies rooted in a
wide-array of disciplines.

Geochemistry: Specific instruments include: three inductively-coupled plasma mass
spectrometers for high-precision trace element (Thermo Element 2 ICPMS and Thermo iCap)
and isotope ratio (Thermo Neptune MC ICPMS) analyses-absorption spectrometers; microwave
for rapid silicate dissolution; modern micro-XRF setup; gas chromatographs, HPLC, and ion
analyzers; infrared, ultraviolet and fluorescent spectrometers; gamma and scintillation
counters; ultracentrifuges; dissolved- and solid-carbon analyzers; and modern wet-chemical
laboratory facilities. There is also a hydrothermal laboratory, including large-capacity rocking
autoclaves, kinetic flow systems, optical high-pressure and high-temperature cells, and an
internally heated high-pressure system.

Geochronology and Petrology: In addition to modern mineral separation and characterization
facilities, Guyot hosts new clean lab facilities suitable for ultra-low blank trace metal
geochemistry used for ion chromatography for Ca, Mg, Sr, U, Pb, Sm, and Nd elemental
separation. The lab also has an IsotopX PhoeniX62 Thermal Ionization Mass Spectrometer used
for high-precision U-Pb geochronology and Sr and Nd isotope measurements. Mineral and rock
geochemistry that accompanies geochronology is carried out in other facilities on campus and
within Guyot, such as in the ICPMS facilities.

The Ocean Tracer Laboratory: Includes alpha detectors and scintillation detectors for measuring
low levels of radon and radium radioisotopes and a high-resolution intrinsic germanium well
detector for gamma ray measurement.

The Stable Isotope Laboratory: Contains a new V. G. Optima gas source mass spectrometer, with
peripheral devices for automated analysis of carbonate minerals and for automated loading
and cleaning of CO2, H2O, and N2 gas mixtures. Off-line preparation facilities are available for
water samples, organic materials, and minerals.

Biological Oceanography Research: Focuses on carbon and nitrogen cycle processes and trace
metals in the oceans. Instruments include controlled temperature rooms for phytoplankton and
bacterial culture, epifluorescence microscopes, centrifuges, scintillation counter, gamma
counter, autoclave, atomic absorption spectrometer, laminar flow hoods, trace metal clean
Geophysics: The High-Pressure Mineral Physics Laboratory contains diamond anvil cells for high-pressure/temperature studies. Included in the facility are stereomicroscopes, microdrill, gas loading system, photoluminescence, and Raman and Brillouin spectroscopy. Access is also available to a wide range of national user facilities for conducting experiments including synchrotrons, free electron lasers, and high-powered laser facilities. Mineral characterization is supported by shared facilities on campus featuring multiple scanning electron microscopes equipped with elemental analysis capabilities in addition to backscattered-electron and cathodoluminescence imaging, TEM, and FIB (see the imaging and analysis center on Princeton’s website). All these facilities are supported by a departmental machine shop.

The department owns several 6-channel digital portable seismometers along with support equipment for small-scale field experiments. For larger experiments abroad, we use portable seismographs from the IRIS Passcal Instrument Center.

We routinely obtain data from digital archives around the world, as well as from our own field experiments. For numerical simulations of seismic wave propagation and tomographic imaging and inversion, we have access to powerful computers provided by the Princeton Institute for Computational Sciences and Engineering (PICSciE), and to even more powerful machines provided by national supercomputing centers.
Geosciences

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Director of Graduate Studies
Jeroen Tromp (mailto:jtromp@princeton.edu)

Graduate Program Administrator
Sheryl Robas (mailto:srobas@princeton.edu)

Application Deadline: December 31 - 11:59PM Eastern Standard Time

Program Length:
5 years

Application Fee: $90

Application Requirements:
Statement of Academic Purpose (/admission/applying-princeton/statement-academic-purpose)
Resume/Curriculum Vitae (/resumecurriculum-vitae)
Recommendation Letters (/recommendation-letters)
Transcripts (/transcripts)
Fall Semester Grades (/fall-semester-grades)
Prerequisite Tests (/prerequisite-tests)
English Language Tests (/english-language-tests)

GRE:
General test
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Ph.D. Requirements:
Courses:
Course work requirements are flexible and depend on the track chosen. All incoming students are required to follow an introductory course on the fundamental questions in the geosciences, covering both solid earth and environmental problems. An important part of graduate education arises from independent research, which begins in the first year. Course work in other departments that strengthens students' background in biology, chemistry, engineering sciences, mathematics and physics is encouraged.

Courses must be taken for a grade when the graded option is offered, and the average of the graded courses is expected to be B or higher.

Pre-generals students are normally expected to enroll in and complete two to four courses or seminars, either within or outside the department, per term. The actual load may vary depending on a student's background, interests, the availability of courses, the number and nature of other academic activities, etc. Students are expected to have completed eight courses, or the equivalent, by the end of the semester in which they take the General Exam. The eight courses must include GEO 505 and 506 – Fundamentals of the Geosciences I and II, and at least two graduate-level or appropriate-level undergraduate courses outside their field of expertise, chosen with approval of the advisory committee. Students must also take GEO/AOS 503 – Responsible Conduct of Research in Geosciences, which does not count towards the eight courses.

Pre-Generals Requirements(s):

Research paper and thesis proposal:
A high-quality research paper summarizing the first two years of research is required prior to taking the general exam. The research paper does not need to be ready for publication, but the paper should have a scholarly level close to that of a paper submitted to a peer-reviewed journal. The research accomplishments should indicate a reasonable level of productivity, and the interpretation should indicate knowledge of the literature and excellent critical thinking. The thesis proposal should clearly express the justification and the research plans. In response to questions, students should show a broad knowledge of the relevant literature, an understanding of the underlying principles, and knowledge of analytical modeling. A research progress report is also required near the end of the student's first year.

General Exam:
The general examination for advancement to Ph.D. candidacy is normally taken before the end of the second year of graduate work. The examination is designed to establish the student's depth and breadth of knowledge in the chosen fields of specialization, advancement in scholarly methods of research, and the ability to organize and present research material. The examination is based in part on a written report submitted by the student describing the research activities undertaken during the first two years.

During the general examination a student is expected to demonstrate competence and professional expertise in the geological sciences and related fields as relevant to the student’s major interests. Accordingly, the examination is designed to explore: (1) the student's ability to organize and conduct an original research program and to present research results and material, (2) the student's depth of knowledge in the chosen fields of specialization, and (3) breadth in the geological and related sciences.

A typical examination consists of two parts: the research paper and thesis proposal, and the two topics of expertise selected by the student. The exam does not normally last longer than 3 hours. The first half of the exam covers the research paper and the thesis proposal, beginning with a student presentation of 20 minutes length. Each committee member will question the student on his or her research area. Then, after a short break, the second part of the exam covers the two topics selected by the student. Each committee member will ask questions testing the student's general knowledge of the basic science underlying the areas of specialization and fundamental concepts in earth sciences and related disciplines.

Qualifying for the M.A.:
The Master of Arts (M.A.) degree is normally an incidental degree on the way to full Ph.D. candidacy and is earned after a student successfully passes all course work, and the first-year and second-year research reports. It may also be awarded to students who, for various reasons, leave the Ph.D. program, provided that these requirements have been met.

Under some circumstances, a student may decide prior to the general exam that he or she does not wish to continue in the Ph.D. program but does wish to qualify for a master's degree (M.A.) from the department. In this case, the student should discuss this option with the adviser and advisory committee well in advance. The general exam for an M.A. degree is similar to that for Ph.D. candidacy but will not include defense of a research plan.

Teaching:
All graduate students are required to participate in the instruction of undergraduates for at least one term (one term as a full assistant in instruction, or two terms as half-time assistant in instruction) as a significant part of their education.

Dissertation and FPO:
The dissertation shows that the candidate has technical mastery in the chosen field and is capable of independent research. It is expected to be a positive contribution to knowledge, which may consist of a new scientific generalization, a new body of integrated facts that carries scientific implications that extend beyond itself or a substantial improvement in technique or procedure.

The final public oral examination is a final examination in the field of study. In addition to defending the dissertation, candidates are expected to respond to questions relating to the specific principles involved in their research and to wide-ranging questions about related subjects.

The Ph.D. will be awarded once the dissertation has been approved and the final public oral has been completed.
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Overview Applying Ph.D. Faculty Courses

Permanent Courses

Courses listed below are graduate-level courses that have been approved by the program's faculty as well as the Curriculum Subcommittee of the Faculty Committee on the Graduate School as permanent course offerings. Permanent courses may be offered by the department or program on an ongoing basis, depending on curricular needs, scheduling requirements, and student interest. Not listed below are undergraduate courses and one-time-only graduate courses, which may be found for a specific term through the Registrar's website. Also not listed are graduate-level independent reading and research courses, which may be approved by the Graduate School for individual students.

AOS 522 Inverse Methods: Theory and Applications (also GEO 522)
Course treats inverse problems from both theoretical and applied perspectives. Students learn to develop the necessary theory to pose, interpret, and solve inverse problems, focusing on topics including error characterization, linear and non-linear methods, approximations, Kalman filters, use of prior constraints, and observing system design. Concepts are illustrated with examples from the current literature on the Earth's carbon cycle.

AOS 527 Atmospheric Radiative Transfer (also GEO 527)
The structure and composition of terrestrial atmospheres. The fundamental aspects of electromagnetic radiation, absorption and emission by atmospheric gases, optical extinction by particles, the roles of atmospheric species in the Earth's radiative energy balance, the
perturbation of climate due to natural and anthropogenic causes, and satellite observations of climate systems are also studied.

**AOS 537 Atmospheric Chemistry (also GEO 537)**

Natural gas phase and heterogeneous chemistry in the troposphere and stratosphere, with a focus on elementary chemical kinetics; photolysis processes; oxygen, hydrogen, and nitrogen chemistry; transport of atmospheric trace species; tropospheric hydrocarbon chemistry and stratospheric halogen chemistry; stratospheric ozone destruction; local and regional air pollution, and chemistry-climate interactions are studied.

**AOS 577 Climate of the Earth: Present, Past and Future (also GEO 577)**

An examination of various components of the Earth's climate system. Emphasis is placed on the role of radiative processes, climate feedbacks and sensitivity, and the nature of energy and water balances. The dynamics and physical interpretation of principal tropospheric circulation systems, including stationary and transient phenomena observed in middle and low latitudes, are studied. Phenomena of topical interest, such as El Niño, seasonal climate anomalies, and natural and anthropogenic climate changes, are also reviewed.

**AOS 578 Chemical Oceanography (also GEO 578)**

The chemical composition of the oceans and the nature of the physical and chemical processes governing this composition in the past and the present. The cycles of major and minor oceanic constituents, including interactions with the biosphere, and at the ocean-atmosphere and ocean-sediment interfaces.

**CEE 573 Environmental Issues Seminar (also GEO 525)**

Current problems in environmental sciences. Element cycles; geochemistry-biotic interactions, human impacts on the environment. A new topic is chosen every semester. Recent topics have included: the global carbon cycle, alternative energies, biodiversity, and genetically modified organisms.

**ENV 531 Topics in Energy and the Environment (also GEO 531/ CEE 583)**

Lectures, readings and discussion of current topics on the interaction of energy and environmental issues. Topics vary from year to year to fit interests of students and faculty and to reflect changing technology and policy. Offered as part of the PEI-BP executive exchange program.

**GEO 501 Physics and Chemistry of Minerals (also MSE 541)**

Concepts of solid-state physics and inorganic chemistry relevant to the study of minerals and materials. The emphasis is on applications to the study of planetary interiors. Topics include crystal chemistry; crystal structure and phase transitions; equations of state, dynamic, and static
GEO 503 Responsible Conduct of Research in Geosciences (Half-Term) (also AOS 503)
Course educates Geosciences and AOS students in the responsible conduct of research using case studies appropriate to these disciplines. This discussion-based course focuses on issues related to the use of scientific data, publication practices and responsible authorship, peer review, research misconduct, conflicts of interest, the role of mentors & mentees, issues encountered in collaborative research and the role of scientists in society. Successful completion is based on attendance, reading, and active participation in class discussions. Course satisfies University requirement for RCR training.

GEO 505 Fundamentals of the Geosciences
A survey of fundamental papers in the Geosciences. Topics include the origin and interior of the earth, plate tectonics, geodynamics, the history of life on earth, the composition of the earth, its oceans and atmosphere, past climate. The first of two core graduate courses.

GEO 506 Fundamentals of the Geosciences II
A survey of fundamental papers in the Geosciences. Topics include present and future climate, biogeochemical processes in the ocean, geochemical cycles, orogenies, thermochronology, rock fracture and seismicity. This is the second of two core graduate courses.

GEO 507 Topics in Mineralogy and Mineral Physics (also MSE 547)
Selected topics related to structure, properties, and stability of minerals and melts. Topics include mantle mineralogy, applications of synchrotron radiation to the study of earth materials, physics and chemistry of minerals at high pressure and temperature, and advanced concepts in mineral physics.

GEO 520 Stable Isotope Geochemistry With An Environmental Focus
Examines the use of stable isotope measurements to investigate important biogeochemical, environmental, and geologic processes, today and over Earth history. Introduction to terminology, basic underlying principles, measurement techniques, commonly used analytical and computational approaches for analyzing data, followed by a review of typical applications of the isotope systems of carbon, oxygen, nitrogen, and other elements. Lectures by the instructor, problem sets, numerical modeling assignments, student presentations and a final student paper based on readings from the scientific literature.

GEO 523 Geomicrobiology (also CEE 572)
Relationships between low temperature geochemistry and microbiology. Applications of newly developed molecular biological techniques and isotope geochemical methods and how these approaches can be used to determine the physiological state of microorganisms. Each student is expected to make a research presentation to the seminar. Visiting scholars and faculty members from other departments may occasionally contribute guest lectures to the seminar.

GEO 526 Geochemical Reactions at the Natural Interfaces
Covers the chemistry of interfacial reactions at the solid-water, air-water, liquid-water, and organism-water that are pertinent to the nature. The molecular structure and properties of the natural interfaces, water chemistry at the interfaces, and applications of thermodynamics, and recently developed in situ spectroscopic and microscopic methods to study these systems is discussed. Special emphasis is on the applications of interfacial chemistry in environmental chemistry.

GEO 534 Geological Constraints on the Global Carbon Cycle
Earth system and climate sensitivity relate changes in greenhouse gas concentrations and other radiative forcers to changes in temperature, both in Earth's past and in the future. The Cenozoic record provided by paleo-temperature and paleo-CO2 proxies can constrain these parameters and thus also the projected response of the planet to human-induced changes in greenhouse gas concentrations. This course will explore the concepts of climate and Earth system sensitivity, the methods and records of paleo-temperature and paleo-carbon dioxide proxies in the Cenozoic, and the statistical challenges of inferring sensitivities from these proxies.

GEO 535 Biogeochemical Cycles in Earth History
Examines the evidence for changes in the cycles of biologically important elements (carbon, nitrogen, phosphorus, etc.) over Earth's history. Topics will include the development and evolution of biogeochemical cycles, their significance for the geologic and fossil records, and biogeochemical change during the last Ice Age. Overview lectures by the instructor and student presentations based on readings from the scientific literature and/or ongoing research.

GEO 538 Paleoclimatology
This course will provide a graduate level introduction to Earth’s climate history. Topics include controls on Earth’s climate, a survey of sedimentary properties used in climate reconstructions, and a discussion of the major changes in climate reconstructions, and a discussion of the major changes in climate from the Precambrian to the present. Intended for students in Geosciences and the Atmospheric and Oceanic Sciences program interested in Earth’s present environment and its changes through time.

GEO 539 Topics in Paleoecology, Paleoclimatology, and Paleoceanography
Application of the fossil record to specific geological problems in depositional environments and paleoclimatic and paleoceanographic history of the oceans are studied.
GEO 543 Rock Fracture
Application of fracture mechanics to a wide range of geologic processes, including jointing, dike propagation, fault growth, and earthquake rupture are studied. Topics include the role of fractures in crustal deformation, solutions for cracks in elastic media, engineering fracture mechanics, numerical methods, and application to field and geodetic studies of natural examples.

GEO 546 Inverse Problems
The probabilistic formulation and solutions to inverse problems; dealing with prior probability and observational uncertainty; Monte Carlo methods for solving inverse problems; Metropolis algorithm; deterministic solutions (using optimization methods; least squares, least absolute values); inverse problems involving waveforms and time series. First part of the course treats discrete inverse problems with a finite set of parameters; second part deals with general inverse problems, which may contain functions as data or unknowns.

GEO 552 Global Seismology
The use of seismic data to determine large-scale, three-dimensional earth structure and earthquake source parameters. Moment-tensor representation of sources, free oscillations, surface-wave dispersion, and seismic tomography.

GEO 556 Geodynamics Seminar
Special topics of current research interest in geodynamics and related disciplines

GEO 557 Theoretical Geophysics
Geophysical applications of the principles of continuum mechanics; conservation laws and constitutive relations and tensor analysis; acoustic, elastic, and gravity wave propagation are studied.

GEO 558 Seismology Seminar
A discussion and study of problems of current research interest in seismology.

GEO 559 Topics In Earth History
Seminar examines the history of global change on Earth. Topics include the relationship between paleogeography, sea level and climate, the character and geometry of Earth's ancient magnetic field, the evolution of Earth's spin vector, the interpretation of global sea level variability, the deconvolution of periodic and stochastic forcing in sedimentary records, and the large-scale events and processes that affected global change and the evolution of life.

GEO 561 Earth's Atmosphere
Earth's habitability depends on the continual recycling of various gases and even rocks, mainly between the atmosphere, oceans, "solid" earth and biosphere. The atmospheric and oceanic
circulations that affect this recycling involve phenomena such as the weather, hurricanes, jet streams, tsunamis, the Gulf Stream, deserts, jungles, El Nino and La Nina. The class discusses how global warming will affect these phenomena.

**GEO 568 Advanced Aqueous Chemistry (also CHM 528)**
This course focuses on selected topics in aqueous chemistry of the natural systems, including: chemistry of inorganic and organic species in aqueous solutions- hydration, hydrolysis, coordination chemistry of metal-ligand complexes, chemical equilibria in fresh and saline water; mineral dissolution and alteration, recrystallization and evolution of secondary phases, dissolution kinetics; nucleation and precipitation of minerals, biological control in mineral precipitation, precipitation kinetics; electron transfer in aquatic systems, redox equilibria and kinetics; chemistry of water-solid/air interfaces.

**GEO 570 Sedimentology**
Treatment of the physical and chemical processes that shape Earth's surface, such as solar radiation, deformation of the solid Earth, and the flow of water (vapor, liquid, and solid) under the influence of gravity. In particular, the generation, transport, and preservation of sediment in response to these processes are studied in order to better read stories of Earth history in the geologic record and to better understand processes involved in modern and ancient environmental change. Taught in parallel with GEO 370.

**GEO 598 Extramural Research Project**
Summer research project designed in conjunction with the student's advisor and an industrial, private or government sponsor that will provide practical experience relevant to the student's research area. Start no earlier than June 1. A final written report is required.
# Degree Deadlines

## To Apply for an Advanced Degree

### Academic Year 2017-18

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<tr>
<th>Degree Deadline for 2017-18:</th>
<th>Degree to be Awarded on:</th>
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<tbody>
<tr>
<td>Friday, September 1, 2017</td>
<td>Saturday, September 16, 2017</td>
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<td>Friday, November 3, 2017</td>
<td>Saturday, November 18, 2017</td>
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<td>Friday, January 5, 2018</td>
<td>Saturday, January 20, 2018</td>
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<tr>
<td>Friday, March 30, 2018</td>
<td>Saturday, April 14, 2018</td>
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<td>Tuesday, May 22, 2018</td>
<td>Tuesday, June 5, 2018</td>
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### Academic Year 2018-19

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<tr>
<th>Degree Deadline for 2018-19:</th>
<th>Degree to be Awarded on:</th>
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<tr>
<td>Friday, September 7, 2018</td>
<td>Saturday, September 22, 2018</td>
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<tr>
<td>Friday, November 2, 2018</td>
<td>Saturday, November 17, 2018</td>
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<td>Friday, January 4, 2019</td>
<td>Saturday, January 19, 2019</td>
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<tr>
<td>Friday, March 22, 2019</td>
<td>Saturday, April 6, 2019</td>
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<tr>
<td>Tuesday, May 21, 2019</td>
<td>Tuesday, June 4, 2019</td>
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**NOTE:**
*Dates are tentative and subject to change before the beginning of the academic year.*
General Examination

Overview

The general examination is designed to ascertain the student's general knowledge of the subject, acquaintance with scholarly methods of research, and ability to organize and present material. Students who pass the general examination in their department may advance to Ph.D. candidacy. The general examination may consist of several parts, some testing comprehension of the field and others assessing potential for original research. Advancement to post-generals candidacy for the Ph.D. requires passage of all parts of the general examination in addition to all other departmental requirements. The examination is comprehensive and is not restricted to the content of graduate courses. The elements of the general examination may be written, oral, or both, depending on the particular requirements of the discipline as determined by the faculty. In both content and format the general examination is considered to be an essential element of a department's Ph.D. program. In most programs, students are not normally readmitted to a third year (fifth term) of graduate study unless they have sustained the general examination and unless they have first fulfilled the residence requirement as well as any departmental requirements. No student should be readmitted to a fourth year (seventh term) of graduate study without having successfully completed the general examination.

Timing

Departments may elect to administer the examination to a student within 10 consecutive days during one of the three examination periods, or, with the approval of the Graduate School, in two or more major parts during different examination periods. (In such cases only the final cumulative grade is reported to the Graduate School.) In either case, the examination is held during a stated twenty-one-day period in October or January, or during a five-week period in April and May. No department is required to give the examination in more than two of the three examination periods per year. Only in exceptional circumstances as approved by the Graduate School may a general examination be administered outside of the stated examination periods. If approved to be administered on an exceptional basis outside the normal stated period, such a general examination must in all other respects follow the normal format and requirements of the general examination for the department.

General Examination Dates (Academic Year 2016-17)

October 10 - October 29, 2016

January 9 - January 27, 2017

April 24 - May 27, 2017
General Examination Dates (Academic Year 2016-17)

Graduate students who withdraw from the University in good standing before passing the general examination (and are therefore not enrolled) may present themselves for the examination with the approval of the dean on the advice of the department, provided they have met the residence and any departmental requirements.

Committee

The examination committee consists of three or more members, all of whom should hold the rank of assistant professor or higher and at least two of whom should normally be on the faculty of Princeton University. Any external examiners must have standing in the scholarly community comparable to committee members of the Princeton faculty. Any proposed external examiners must be approved by the Graduate School prior to the examination date.

Failure

Students who fail the general examination a first time may on the recommendation of the department stand for reexamination within a year. Students who fail the general examination a second and final time have their Ph.D. candidacy and enrollment terminated at the first of the month following that in which the examination was retaken.
Ph.D. Advising and Requirements

By design, Princeton emphasizes comparatively short and intensive programs of doctoral study. The Graduate School therefore has few central requirements for doctoral candidates beyond the standard requirements (https://gradschool.princeton.edu/academics/degree-requirements/standard-requirements) for all graduate students related to administrative standing, residency, and full-time study.

To qualify for the Ph.D., students are required by the Graduate School to pass the general examination (https://gradschool.princeton.edu/academics/degree-requirements/phd-requirements/general-examination) in their subject; to present an acceptable dissertation (https://gradschool.princeton.edu/academics/degree-requirements/phd-requirements/dissertation-and-fpo); and, after receiving approval of the advanced degree application from the department and the Graduate School, to pass the final public oral examination (https://gradschool.princeton.edu/academics/degree-requirements/phd-requirements/dissertation-and-fpo). Any additional requirements are set at the level of the department or program.

Dissertation and Research Advising

Ph.D. students at the research stage of their programs are required to have faculty advisers who can appropriately advise their topics and who are willing to advise them. This is an essential requirement in order for a Ph.D. student to remain enrolled and successfully work towards completing the degree. The point at which the research stage begins may differ from program to program, depending on individual program requirements and funding models. In certain fields organized by laboratory and research groups, the requirement for a student to identify an adviser may start as early as the end of the first academic year. In other fields, the requirement may start at the point when the student has successfully passed the general examination and formally been approved to enter the dissertation phase and advance to candidacy for the Ph.D.

Princeton’s departments and programs have broad academic expertise, and Ph.D. students have the opportunity to work with faculty who are experts in many fields and subfields of academic research. While the range of topics that Ph.D. students may pursue for dissertation work is wide, it nonetheless may be limited by the interests and expertise of the faculty. Students may need to adjust their research topics in order to align them with faculty expertise if they wish to complete the degree. Adjustment of topic may be necessary, for example, if a student's adviser leaves the University, particularly if the student has not yet completed the general examination and no other faculty within the department can appropriately advise on the student’s originally intended topic. (Students who have completed the general examination and are in the dissertation phase may be approved in certain circumstances to continue to work with advisers who have left the University. See Graduate Committee Requirements (https://gradschool.princeton.edu/academics/degree-requirements/graduate-committee-requirements) and associated clarification in the External Advisers section.)
It is a Ph.D. student's responsibility to identify a research topic and secure an appropriate research adviser. Faculty within departments, including and especially directors of graduate studies, will make every reasonable effort to help students find and secure appropriate advisers, provided students are otherwise making satisfactory degree progress. Students who feel that satisfactory resolution of an advising issue has not been found even after consulting with the relevant faculty within the department may consult with the Academic Affairs staff within the Office of the Dean of the Graduate School. (See Rights, Rules, Responsibilities [http://www.princeton.edu/pub/rrr/index.xml], Section 2.6 - The Graduate School [http://www.princeton.edu/pub/rrr/part2/index.xml#comp26], especially the entry titled "Graduate Student Grievances," for more information.) In cases where, despite all reasonable efforts, no satisfactory advising structure can be found for a student, that student's enrollment and degree candidacy may be terminated.